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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XF340

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Mukilteo Multimodal Construction Project in Washington State

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed incidental harassment authorization (IHA); request for comments.

SUMMARY: NMFS has received a request from Washington State Department of Transportation (WSDOT) for authorization to take marine mammals incidental to Mukilteo Multimodal Construction Project in Washington State. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an IHA to incidentally take marine mammals during the specified activities.

DATES: Comments and information must be received no later than [*insert date 30 days after date of publication in the FEDERAL REGISTER*].

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service. Physical comments should be sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.guan@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments

to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted online at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm* without change. All personal identifying information (*e.g.*, name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Shane Guan, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the applications and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the

permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

NMFS has defined "negligible impact" in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

The MMPA states that the term "take" means to harass, hunt, capture, kill or attempt to harass, hunt, capture, or kill any marine mammal.

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

National Environmental Policy Act

Issuance of an MMPA 101(a)(5)(D) authorization requires compliance with the National Environmental Policy Act.

NMFS preliminary determined the issuance of the proposed IHA is consistent with categories of activities identified in CE B4 (issuance of incidental harassment authorizations under section 101(a)(5)(A) and (D) of the MMPA for which no serious injury or mortality is anticipated) of the Companion Manual for NAO 216-6A and we have not identified any extraordinary circumstances listed in Chapter 4 of the Companion Manual for NAO 216-6A that would preclude this categorical exclusion.

We will review all comments submitted in response to this notice prior to making a final decision as to whether application of this CE is appropriate in this circumstance.

Summary of Request

NMFS received a request from WSDOT for an IHA to take marine mammals incidental to Mukilteo Multimodal Project in Mukilteo, Washington. WSDOT's request was for harassment only and NMFS concurs that serious injury or mortality is not expected to result from this activity. Therefore, an IHA is appropriate.

On April 7, 2016, WSDOT submitted a request to NMFS requesting an IHA for the possible harassment of small numbers of marine mammal species incidental to construction associated with the Mukilteo Multimodal Project in Mukilteo, Washington, between August 1, 2017, and July 31, 2018. WSDOT subsequently updated its project scope and submitted a revised IHA application on April 10, 2017. NMFS determined the IHA application was complete on April 14, 2017. NMFS is proposing to authorize the take by Level A and Level B harassment of the following marine mammal species: harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*), northern elephant seal (*Mirounga angustirostris*), killer whale (*Orcinus orca*), gray whale (*Eschrichtius robustus*), humpback whale (*Megaptera novaeangliae*), harbor porpoise (*Phocoena phocoena*), and Dall's porpoise (*P. dalli*).

Description of Proposed Activity

Overview

The purpose of the Mukilteo Multimodal Project is to provide safe, reliable, and effective service and connection for general-purpose transportation, transit, high occupancy vehicles (HOV), pedestrians, and bicyclists traveling between Island County and the Seattle/Everett

metropolitan area and beyond by constructing a new ferry terminal. The current Mukilteo Ferry Terminal has not had significant improvements for almost 30 years and needs key repairs. The existing facility is deficient in a number of aspects, such as safety, multimodal connectivity, capacity, and the ability to support the goals of local and regional long-range transportation and comprehensive plans. The project is intended to:

- Reduce conflicts, congestion, and safety concerns for pedestrians, bicyclists, and motorists by improving local traffic and safety at the terminal and the surrounding area that serves these transportation needs.
- Provide a terminal and supporting facilities with the infrastructure and operating characteristics needed to improve the safety, security, quality, reliability, efficiency, and effectiveness of multimodal transportation.
- Accommodate future demand projected for transit, HOV, pedestrian, bicycle, and general-purpose traffic.

The proposed Mukilteo Multimodal Project would involve in-water impact and vibratory pile driving and vibratory pile removal. Details of the proposed construction project are provided below.

Dates and Duration

Due to NMFS and the U.S. Fish and Wildlife Service (USFWS) in-water work timing restrictions to protect ESA-listed salmonids, planned WSDOT in-water construction is limited each year to July 16 through February 15. For this project, in-water construction is planned to take place between August 1, 2017 and February 15, 2018. The total worst-case time for pile installation and removal is 175 days (Table 1).

Specified Geographic Region

The Mukilteo Ferry Terminal is located in the City of Mukilteo, Snohomish County, Washington. The terminal is located in Township 28 North, Range 4 East, Section 3, in Possession Sound. The new terminal will be approximately 1,700 ft east of the existing terminal in Township 28N, Range 4E, Section 33 (Figure 1-2 of the IHA application). Land use in the Mukilteo area is a mix of residential, commercial, industrial, and open space and/or undeveloped lands.

Detailed Description of In-water Pile Driving Associated with Mukilteo Multimodal Project

The proposed project has two elements involving noise production that may affect marine mammals: vibratory hammer driving and removal, and impact hammer driving.

(1) Vibratory Hammer Driving and Removal

Vibratory hammers are commonly used in steel pile driving where sediments allow, and involve the same vibratory hammer used in pile removal. The pile is placed into position using a choker and crane, and then vibrated between 1,200 and 2,400 vibrations per minute. The vibrations liquefy the sediment surrounding the pile allowing it to penetrate to the required seating depth, or to be removed. The type of vibratory hammer that will be used for the project will likely be an APE 400 King Kong (or equivalent) with a drive force of 361 tons.

(2) Impact Hammer Installation

Impact hammers are used to install plastic/steel core, wood, concrete, or steel piles. An impact hammer is a steel device that works like a piston. Impact hammers are usually large, though small impact hammers are used to install small diameter plastic/steel core piles.

Impact hammers have guides (called a lead) that hold the hammer in alignment with the pile while a heavy piston moves up and down, striking the top of the pile, and drives it into the substrate from the downward force of the hammer on the top of the pile.

To drive the pile, the pile is first moved into position and set in the proper location using a choker cable or vibratory hammer. Once the pile is set in place, pile installation with an impact hammer can take less than 15 minutes under good conditions, to over an hour under poor conditions (such as glacial till and bedrock, or exceptionally loose material in which the pile repeatedly moves out of position).

Impact hammer is also used for "proofing" after pile is driven using a vibratory hammer to set the pile firmly.

Details of pile driving activities are provided below and are summarized in Table 1.

- Vibratory driving of 24-inch temporary steel pile and steel piles for a public fishing pier. Installation of each pile will take approximately 60 minutes, 3 piles installed per day, with 117 piles installed over 39 days.
- Vibratory removal of 69 temporary 24-inch diameter steel piles. This will take approximately 15 minutes per pile, with 3 piles removed per day over 23 days.
- Vibratory driving of 40 30-inch steel piles. This will take approximately 60 minutes per pile, with 3 piles installed per day over 14 days.
- Vibratory removal of 2 30-inch test steel piles. This will take approximately 15 minutes per pile, with both piles removed in 1 day.
- Vibratory removal of 7 30-inch inner dolphin steel piles. This will take approximately 15 minutes per pile, with all 7 piles removed in 1 day.
- Vibratory driving of 6 36-inch steel piles. This will take approximately 60 minutes per pile, with 3 piles installed per day over 2 days.
- Vibratory driving of 2 78-inch diameter drilled steel shafts. This will take approximately 60 minutes to install in one day.

- Vibratory driving of a 120-inch diameter drilled steel shaft. This will take approximately 60 minutes to install in one day.
- Vibratory driving of 139 steel H-piles. This will take approximately 30 minutes per pile, with 10 piles installed per day over 14 days.
- Vibratory driving of 90 temporary steel sheet piles. This will take approximately 30 minutes per pile, with 3 sheet piles installed per day over 30 days.
- Vibratory removal of 90 temporary steel sheet piles. This will take approximately 15 minutes per pile, with 6 piles removed per day over 15 days.
- Impact driving (proofing; 300 strikes per pile) of 68 temporary 24-inch diameter steel piles. This will take approximately 15 minutes per pile, with 3 piles installed per day over 23 days.
- Impact driving (proofing; 300 strikes per pile) of 5 30-inch diameter steel piles. This will take approximately 15 minutes per pile, with all 5 piles installed in 1 day.
- Impact driving with 3000 strikes per pile of 25 30-inch diameter steel piles. This will take approximately 15 minutes per pile, with 3 piles installed per day over 9 days.

Table 1. Summary of in-water pile driving durations.

Method	Pile type	Pile size (inch)	Pile number	Duration (min./sec.) per pile (vib.) or Strikes per pile (impact)	Duration (days)
Vibratory driving	Steel	24	117	60/3600	39
Vibratory removal	Steel	24	69	15/900	23
Vibratory driving	Steel	30	40	60/3600	14
Vibratory removal	Steel	30	2	30/1800	1
Vibratory removal	Steel	30	7	15/1800	1
Vibratory driving	Steel	36	6	60/3600	2
Vibratory driving	Steel shaft	78	2	60/3600	2
Vibratory driving	Steel shaft	120	1	60/3600	1
Vibratory driving	Steel H-pile	12	139	30/1800	14

Vibratory driving	Steel sheet	-	90	30/1800	30
Vibratory removal	Steel sheet	-	90	15/900	15
Impact proofing	Steel	24	68	300	23
Impact driving	Steel	30	25	3000	9
Impact proofing	Steel	30	5	300	1
Total			661		175

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see "Proposed Mitigation" and "Proposed Monitoring and Reporting").

Description of Marine Mammals in the Area of Specified Activities

We have reviewed the applicants' species information—which summarizes available information regarding status and trends, distribution and habitat preferences, behavior and life history, and auditory capabilities of the potentially affected species—for accuracy and completeness and refer the reader to Sections 3 and 4 of the applications, as well as to NMFS's Stock Assessment Reports (SAR; *www.nmfs.noaa.gov/pr/sars/*), instead of reprinting all of the information here. Additional general information about these species (e.g., physical and behavioral descriptions) may be found on NMFS's website (*www.nmfs.noaa.gov/pr/species/mammals/*), or in the U.S. Navy's Marine Resource Assessments (MRA) for relevant operating areas. The MRAs are available online at: *www.navfac.navy.mil/products_and_services/ev/products_and_services/marine_resources/marine_resource_assessments.html*. Table 2 lists all species with expected potential for occurrence in Mukilteo project area and summarizes information related to the population or stock, including potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2016). PBR, defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population, is considered in concert with

known sources of ongoing anthropogenic mortality to assess the population-level effects of the anticipated mortality from a specific project (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality are included here as gross indicators of the status of the species and other threats. Species that could potentially occur in the proposed survey areas but are not expected to have reasonable potential to be harassed by WSDOT's Mukilteo Multimodal project are described briefly but omitted from further analysis. These include extralimital species, which are species that do not normally occur in a given area but for which there are one or more occurrence records that are considered beyond the normal range of the species. For status of species, we provide information regarding U.S. regulatory status under the MMPA and ESA.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock.

Nine species (with 10 managed stocks) are considered to have the potential to co-occur with the proposed construction activities. Extralimital species or stocks unlikely to co-occur with the Mukilteo project include bottlenose dolphin, long-beaked common dolphin, Risso's dolphin, Bryde's whale, and minke whale. All values presented in Table 2 are the most recent available at the time of publication and are available in the 2015 SARs (Carretta et al. 2016) and draft 2016 SARs (available online at: *www.nmfs.noaa.gov/pr/sars/draft.htm*).

Table 2. Marine mammals with potential presence within the proposed project area

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, N_{min}, most recent abundance survey)[2]	PBR	Annual M/SI[3]

Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)						
Family Eschrichtiidae						
Gray whale	*Eschrichtius robustus*	Eastern North Pacific	N	20,990	624	132
Family Balaenopteridae (rorquals)						
Humpback whale	*Megaptera novaeangliae*	California/Oregon/ Washington	Y	1,918	11.0	6.5
Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Delphinidae						
Killer whale	*Orcinus orca*	Eastern North Pacific Southern Resident	Y	78	0	0
		West coast transient	N	243	2.4	0
Family Phocoenidae (porpoises)						
Harbor porpoise	*Phocoena phocoena*	Washington inland waters	N	11,233	66	7.2
Dall's porpoise	*P. dalli*	California/Oregon/ Washington	N	25,750	172	0.3
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California sea lion	*Zalophus californianus*	U.S.	N	296,750	9,200	389
Steller sea lion	*Eumetopias jubatus*	Eastern U.S.	N	71,562	2,498	108
Family Phocidae (earless seals)						
Harbor seal	*Phoca vitulina*	Washington northern inland waters	N	11,036[4]	1,641	43
Elephant seal	*Mirounga angustirostris*	California breeding	N	179,000	2,882	8.8

[1]Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[2]NMFS marine mammal stock assessment reports online at: *www.nmfs.noaa.gov/pr/sars/*. CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance.

[3]These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.*, commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

[4]Harbor seal estimate is based on data that are 8 years old, but this is the best available information for use here.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The "Estimated Take by Incidental Harassment" section later in this document will include a quantitative analysis of the number of individuals that are expected to be taken by this activity. The "Negligible Impact Analysis and Determination" section will consider the content of this section, the "Estimated Take by Incidental Harassment" section, and the "Proposed Mitigation" section, to draw

conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

Potential impacts to marine mammals from the proposed Mukilteo ferry terminal construction are from noise generated during in-water pile driving and pile removal activities.

Acoustic Effects

Here, we first provide background information on marine mammal hearing before discussing the potential effects of the use of active acoustic sources on marine mammals.

Marine Mammal Hearing – Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (e.g., Richardson et al., 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall et al. (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2016) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 dB threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall et al. (2007) retained. The functional

groups and the associated frequencies are indicated below (note that these frequency ranges correspond to the range for the composite group, with the entire range not necessarily reflecting the capabilities of every species within that group):

- Low-frequency cetaceans (mysticetes): generalized hearing is estimated to occur between approximately 7 Hz and 35 kHz, with best hearing estimated to be from 100 Hz to 8 kHz;
- Mid-frequency cetaceans (larger toothed whales, beaked whales, and most delphinids): generalized hearing is estimated to occur between approximately 150 Hz and 160 kHz, with best hearing from 10 to less than 100 kHz;
- High-frequency cetaceans (porpoises, river dolphins, and members of the genera Kogia and Cephalorhynchus; including two members of the genus Lagenorhynchus, on the basis of recent echolocation data and genetic data): generalized hearing is estimated to occur between approximately 275 Hz and 160 kHz.
- Pinnipeds in water; Phocidae (true seals): generalized hearing is estimated to occur between approximately 50 Hz to 86 kHz, with best hearing between 1-50 kHz;
- Pinnipeds in water; Otariidae (eared seals): generalized hearing is estimated to occur between 60 Hz and 39 kHz, with best hearing between 2-48 kHz.
- The pinniped functional hearing group was modified from Southall *et al*. (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al*., 2006; Kastelein *et al*., 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2016) for a review of available information. Nine marine mammal species (5 cetacean

and 4 pinniped (2 otariid and 2 phocid) species) have the reasonable potential to co-occur with the proposed survey activities. Please refer to Table 2. Of the cetacean species that may be present, 2 are classified as low-frequency cetaceans (*i.e.*, all mysticete species), 1 is classified as mid-frequency cetaceans (*i.e.*, killer whale), and 2 are classified as high-frequency cetaceans (*i.e.*, harbor porpoise and Dall's porpoise).

The WSDOT's Mukilteo Multimodal construction work using in-water pile driving and pile removal could adversely affect marine mammal species and stocks by exposing them to elevated noise levels in the vicinity of the activity area.

Exposure to high intensity sound for a sufficient duration may result in auditory effects such as a noise-induced threshold shift—an increase in the auditory threshold after exposure to noise (Finneran *et al.*, 2005). Factors that influence the amount of threshold shift include the amplitude, duration, frequency content, temporal pattern, and energy distribution of noise exposure. The magnitude of hearing threshold shift normally decreases over time following cessation of the noise exposure. The amount of threshold shift just after exposure is the initial threshold shift. If the threshold shift eventually returns to zero (*i.e.*, the threshold returns to the pre-exposure value), it is a temporary threshold shift (Southall *et al.*, 2007).

Threshold Shift (noise-induced loss of hearing) – When animals exhibit reduced hearing sensitivity (*i.e.*, sounds must be louder for an animal to detect them) following exposure to an intense sound or sound for long duration, it is referred to as a noise-induced threshold shift (TS). An animal can experience temporary threshold shift (TTS) or permanent threshold shift (PTS). TTS can last from minutes or hours to days (*i.e.*, there is complete recovery), can occur in specific frequency ranges (*i.e.*, an animal might only have a temporary loss of hearing sensitivity between the frequencies of 1 and 10 kHz), and can be of varying amounts (for example, an

animal's hearing sensitivity might be reduced initially by only 6 decibel (dB) or reduced by 30 dB). PTS is permanent, but some recovery is possible. PTS can also occur in a specific frequency range and amount as mentioned above for TTS.

For marine mammals, published data are limited to the captive bottlenose dolphin, beluga, harbor porpoise, and Yangtze finless porpoise (Finneran *et al*., 2000, 2002, 2003, 2005, 2007, 2010a, 2010b; Finneran and Schlundt, 2010; Lucke *et al*., 2009; Mooney *et al*., 2009a, 2009b; Popov *et al*., 2011a, 2011b; Kastelein *et al*., 2012a; Schlundt *et al*., 2000; Nachtigall *et al*., 2003, 2004). For pinnipeds in water, data are limited to measurements of TTS in harbor seals, an elephant seal, and California sea lions (Kastak *et al*., 1999, 2005; Kastelein *et al*., 2012b).

Lucke *et al*. (2009) found a threshold shift (TS) of a harbor porpoise after exposing it to airgun noise with a received sound pressure level (SPL) at 200.2 dB (peak–to-peak) re: 1 micropascal (μPa), which corresponds to a sound exposure level of 164.5 dB re: 1 μPa^2 s after integrating exposure. Because the airgun noise is a broadband impulse, one cannot directly determine the equivalent of rms SPL from the reported peak-to-peak SPLs. However, applying a conservative conversion factor of 16 dB for broadband signals from seismic surveys (McCauley, *et al*., 2000) to correct for the difference between peak-to-peak levels reported in Lucke *et al*. (2009) and rms SPLs, the rms SPL for TTS would be approximately 184 dB re: 1 μPa, and the received levels associated with PTS (Level A harassment) would be higher. Therefore, based on these studies, NMFS recognizes that TTS of harbor porpoises is lower than other cetacean species empirically tested (Finneran & Schlundt, 2010; Finneran *et al*., 2002; Kastelein and Jennings, 2012).

Marine mammal hearing plays a critical role in communication with conspecifics, and interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.*, recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious (similar to those discussed in auditory masking, below). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that occurs during a time where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. Also, depending on the degree and frequency range, the effects of PTS on an animal could range in severity, although it is considered generally more serious because it is a permanent condition. Of note, reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al*., 2007), so one can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

In addition, chronic exposure to excessive, though not high-intensity, noise could cause masking at particular frequencies for marine mammals, which utilize sound for vital biological functions (Clark *et al.,* 2009). Acoustic masking is when other noises such as from human sources interfere with animal detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance fitness in survival and reproduction.

Masking occurs at the frequency band that the animals utilize. Therefore, since noise generated from vibratory pile driving is mostly concentrated at low frequency ranges, it may have less effect on high frequency echolocation sounds by odontocetes (toothed whales). However, lower frequency man-made noises are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey noise. It may also affect communication signals when they occur near the noise band and thus reduce the communication space of animals (*e.g.*, Clark *et al.,* 2009) and cause increased stress levels (*e.g.*, Foote *et al.,* 2004; Holt *et al.,* 2009).

Unlike TS, masking, which can occur over large temporal and spatial scales, can potentially affect the species at population, community, or even ecosystem levels, as well as individual levels. Masking affects both senders and receivers of the signals and could have long-term chronic effects on marine mammal species and populations. Recent science suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of sound pressure level) in the world's ocean from pre-industrial periods, and most of these increases are from distant shipping (Hildebrand 2009). For WSDOT's Mukilteo Multimodal construction activities, noises from vibratory pile driving and pile removal contribute to the elevated ambient noise levels in the project area, thus increasing potential for or severity of masking. Baseline ambient noise levels in the vicinity of project area are high due to ongoing shipping, construction and other activities in the Puget Sound.

Finally, marine mammals' exposure to certain sounds could lead to behavioral disturbance (Richardson *et al.,* 1995), such as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding);

visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (*e.g.*, pinnipeds flushing into water from haulouts or rookeries).

The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Southall *et al.,* 2007). Currently NMFS uses a received level of 160 dB re 1 μPa (rms) to predict the onset of behavioral harassment from impulse noises (such as impact pile driving), and 120 dB re 1 μPa (rms) for continuous noises (such as vibratory pile driving). For the WSDOT's Mukilteo Multimodal construction activities, both of these noise levels are considered for effects analysis because WSDOT plans to use both impact and vibratory pile driving, as well as vibratory pile removal.

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be biologically significant if the change affects growth, survival, and/or reproduction, which depends on the severity, duration, and context of the effects.

Potential Effects on Marine Mammal Habitat

The primary potential impacts to marine mammal habitat are associated with elevated sound levels produced by vibratory pile removal and pile driving in the area. However, other potential impacts to the surrounding habitat from physical disturbance are also possible.

With regard to fish as a prey source for cetaceans and pinnipeds, fish are known to hear and react to sounds and to use sound to communicate (Tavolga *et al*. 1981) and possibly avoid predators (Wilson and Dill 2002). Experiments have shown that fish can sense both the strength and direction of sound (Hawkins 1981). Primary factors determining whether a fish can sense a

sound signal, and potentially react to it, are the frequency of the signal and the strength of the signal in relation to the natural background noise level.

The level of sound at which a fish will react or alter its behavior is usually well above the detection level. Fish have been found to react to sounds when the sound level increased to about 20 dB above the detection level of 120 dB (Ona 1988); however, the response threshold can depend on the time of year and the fish's physiological condition (Engas *et al*., 1993). In general, fish react more strongly to pulses of sound (such as noise from impact pile driving) rather than continuous signals (such as noise from vibratory pile driving) (Blaxter *et al*., 1981), and a quicker alarm response is elicited when the sound signal intensity rises rapidly compared to sound rising more slowly to the same level.

During the coastal construction only a small fraction of the available habitat would be ensonified at any given time. Disturbance to fish species would be short-term and fish would return to their pre-disturbance behavior once the pile driving activity ceases. Thus, the proposed construction would have little, if any, impact on marine mammals' prey availability in the area where construction work is planned.

Finally, the time of the proposed construction activity would avoid the spawning season of the ESA-listed salmonid species.

Estimated Take

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of whether the number of takes is "small" and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment"

as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would primarily be by Level B harassment, as noise generated from in-water impact pile driving and vibratory pile driving and pile removal has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result, primarily for high frequency cetaceans (harbor and Dall's porpoises) and phocid seals (harbor and northern elephant seals) due to larger predicted auditory injury zones. Auditory injury is unlikely to occur for low- and mid-frequency cetaceans and otarrids. The proposed mitigation and monitoring measures are expected to minimize the severity of such taking to the extent practicable. Below we describe how the take is estimated.

Basis for Takes

Take estimates are based on average marine mammal density in the project area multiplied by the area size of ensonified zones within which received noise levels exceed certain thresholds (*i.e.*, Level A and/or Level B harassment) from specific activities, then multiplied by the total number of days such activities would occur. Certain adjustments were made for marine mammals whose local abundance are known through long-term monitoring efforts. Therefore, their local abundance data are used for take calculation instead of general animal density (see below).

Basis for Threshold Calculation

As discussed above, in-water pile removal and pile driving (vibratory and impact) generate loud noises that could potentially harass marine mammals in the vicinity of WSDOT's proposed Mukilteo Multimodal project.

Under the NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Guidance), dual criteria are used to assess marine mammal auditory injury (Level A harassment) as a result of noise exposure (NMFS 2016). The dual criteria under the Guidance provide onset thresholds in instantaneous peak SPLs (L_{pk}) as well as 24-hr cumulative sound exposure levels (SEL_{cum} or L_E) that could cause PTS to marine mammals of different hearing groups. The peak SPL is the highest positive value of the noise field, log transformed to dB in reference to 1 µPa.

$$L_{pk} = \max\left\{10\log 10\left(\frac{p(t)}{p_{ref}}\right)^2\right\} \qquad (1)$$

where $p(t)$ is acoustic pressure in pascal or micropascal, and p_{ref} is reference acoustic pressure equal to 1 µPa.

The cumulative SEL is the total sound exposure over the entire duration of a given day's pile driving activity, specifically, pile driving occurring within a 24-hr period.

$$L_E = 10\log_{10}\left(\int_{t_1}^{t_2}\left(\frac{p(t)}{p_{ref}}\right)^2 dt\right) \qquad (2)$$

where $p(t)$ is acoustic pressure in pascal or micropascal, p_{ref} is reference acoustic pressure equals to 1 µPa, t_1 marks the beginning of the time, and t_2 the end of time.

For onset of Level B harassment, NMFS continues to use the root-mean-square (rms) sound pressure level (SPL_{rms}) at 120 dB re 1 µPa and 160 dB re 1 µPa as the received levels from

non-impulse (vibratory pile driving and removal) and impulse sources (impact pile driving) underwater, respectively. The SPL_{rms} for pulses (such as those from impact pile driving) should contain 90 percent of the pulse energy, and is calculated by

$$SPL_{rms} = 10\log_{10}\left(\frac{1}{T}\int_{t_1}^{t_2}\left(\frac{p(t)}{p_{ref}}\right)^2 dt\right) \quad (3)$$

where $p(t)$ is acoustic pressure in pascal or micropascal, p_{ref} is reference acoustic pressure equals to 1 µPa, t_1 marks the beginning of the time, and t_2 the end of time. In the case of an impulse noise, t_1 marks the time of 5 percent of the total energy window, and t_2 the time of 95 percent of the total energy window.

Table 3 summarizes the current NMFS marine mammal take criteria.

Table 3. Current Acoustic Exposure Criteria for Non-explosive Sound Underwater.

Hearing Group	PTS Onset Thresholds		Behavioral Thresholds	
	Impulsive	**Non-impulsive**	**Impulsive**	**Non-impulsive**
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB	$L_{rms,flat}$: 160 dB	$L_{rms,flat}$: 120 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB		
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB		
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB		
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB		

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is

defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Sound Levels and Acoustic Modeling for the Proposed Construction Activity

Source Levels

The project includes vibratory pile driving and removal of 24-, 30-, and 36-inch (in) steel piles, vibratory driving of 78- and 120-in steel shaft, vibratory driving of steel H-piles, vibratory driving and removal of steel sheet piles, and impact pile driving and proofing of 24- and 30-in steel piles.

Source levels of the above pile driving activities are based on measurements of the same material types and same or similar dimensions of piles measured at Mukilteo or elsewhere. Specifically, the source level for vibratory pile driving and removal of the 24-in steel pile is based on vibratory test pile driving of the same pile at the Friday Harbor (WSDOT, 2010a). The unweighted SPL_{rms} source level at 10 m from the pile is 162 dB re 1 re 1 µPa. We consider that using vibratory pile installation source level as a proxy for vibratory pile removal is conservative.

The source level for vibratory pile driving and removal of the 30-in steel pile is based on vibratory pile driving of the same pile at Port Townsend (WSDOT, 2010b). The unweighted SPL_{rms} source level at 10 m from the pile is 174 dB re 1 re 1 µPa.

The source level for vibratory pile driving the 36-in steel piles is based on vibratory test pile driving of 36-in steel piles at Port Townsend in 2010 (Laughlin 2011). Recordings of

vibratory pile driving were made at a distance of 10 m from the pile. The results show that the unweighted SPL_{rms} for vibratory pile driving of 36-in steel pile was 177 dB re 1 µPa.

Source level for vibratory pile driving of the 78- and 120-in steel shaft is based on measurements of 72-in steel piles vibratory driving conducted by CALTRANS. The unweighted SPL_{rms} source level ranged between 170 and 180 dB re 1 µPa at 10 m from the pile (CALTRANS 2012). The value of 180 dB is chosen to be more conservative.

The source level for vibratory pile driving of steel H-piles is based on measurements conducted by the California Department of Transportation (CALTRANS). The unweighted SPL_{rms} source level is 150 dB re 1 re 1 µPa at 10 m from the pile (CALTRANS, 2012).

The source level for vibratory sheet pile driving and removal is based on measurements at the Elliott Bay Seawall Project. The unweighted SPL_{rms} source level is 164 dB re 1 re 1 µPa at 10 m from the pile (Greenbusch 2015).

Source levels for impact pile driving of the 24-in steel piles are based on impact test pile driving of the same steel pile during the Vashon Acoustic Monitoring by WSDOT (Laughlin, 2015). The unweighted back-calculated source levels at 10 m are 174 dB re 1 μPa^2-s for single strike SEL (SEL_{ss}) and 189 dB re 1 µPa for SPL_{rms}.

Source levels for impact pile driving of the 30-in steel pile are based on impact test pile driving for the 36-in steel pile at Mukilteo in November 2006. Recordings of the impact pile driving that were made at a distance of 10 m from the pile were analyzed using Matlab. The results show that the unweighted source levels are 178 dB re 1 μPa^2-s for SEL_{ss} and 193 dB re 1 µPa for SPL_{rms}.

A summary of source levels from different pile driving and pile removal activities is provided in Table 4.

Table 4. Summary of in-water pile driving source levels (at 10 m from source).

Method	Pile type / size (inch)	SEL (SEL_{ss} for impact pile driving), dB re 1 μPa^2-s	SPL_{rms}, dB re 1 μPa^2
Vibratory driving / removal	Steel, 24-in	162	162
Vibratory driving / removal	Steel, 30-in	174	174
Vibratory driving	Steel, 36-in	177	177
Vibratory driving	Steel shaft, 78-in	180	180
Vibratory driving	Steel shaft, 120-in	180	180
Vibratory driving	Steel H-pile, 12-in	150	150
Vibratory driving / removal	Steel sheet	164	164
Impact driving	Steel, 24-in	174	189
Impact driving	Steel, 30-in	178	193

These source levels are used to compute the Level A ensonified zones and to estimate the Level B harassment zones. For Level A harassment zones, zones calculated using cumulative SEL are all larger than those calculated using SPL_{peak}, therefore, only zones based on cumulative SEL for Level A harassment are used.

Source spectrum of the 36-in steel pile recording is used for spectral modeling for the 24-, 30-, and 36-in steel pile vibratory pile driving and removal to calculate Level A exposure distances based on cumulative SEL metric (see below).

For other piles where no recording is available, source modeling cannot be performed. In such cases, the weighting factor adjustment (WFA) recommended by NMFS acoustic guidance (NMFS 2016) was used to determine Level A exposure distances.

Estimating Injury Zones

Calculation and modeling of applicable ensonified zones are based on source measurements of comparable types and sizes of piles driven by different methods (impact vs.

vibratory hammers) as described above. As mentioned earlier, isopleths for injury zones are based on cumulative SEL (L_E) criteria.

For peak SPL (L_{pk}), distances to marine mammal injury thresholds were calculated using a simple geometric spreading model using a transmission loss coefficient of 15:

$$SL_{Measure} = EL + 15\log_{10}\left(R - D_{Measure}\right) \quad (4)$$

where $SL_{Measure}$ is the measured source level in dB re 1 µPa, EL is the specific received level of threshold, $D_{Measure}$ is the distance (m) from the source where measurements were taken, and R is the distance (radius) of the isopleth to the source in meters.

For cumulative SEL (L_E), distances to marine mammal exposure thresholds were computed using spectral modeling that incorporates frequency specific absorption. First, representative pile driving sounds recorded during test pile driving with impact and vibratory hammers were used to generate power spectral densities (PSDs), which describe the distribution of power into frequency components composing that sound, in 1-Hz bins. Parseval's theorem, which states that the sum of the square of a function is equal to the sum of the square of its transform, was applied to ensure that all energies within a strike (for impact pile driving) or a given period of time (for vibratory pile driving) were captured through the fast Fourier transform, an algorithm that converts the signal from its original domain (in this case, time series) to a representation in frequency domain. For impact pile driving, broadband PSDs were generated from SPL_{rms} time series with a time window that contains 90 percent of each pulse energy. For vibratory pile driving, broadband PSDs were generated from a series of continuous 1-second SEL. Broadband PSDs were then adjusted based on weighting functions of marine mammal hearing groups (Finneran 2016) by using the weighting function as a band-pass filter. For impact pile driving, cumulative exposures (E_{sum}) were computed by multiplying the single

rms pressure squared by rms pulse duration for the specific strike, then by the number of strikes (provided in Table 1) required to drive one pile, then by the number of piles to be driven in a given day, as shown in the equation below:

$$E_{sum} = \sum_{i=1}^{N} p_{rms,i}^2 \tau_i N_s \qquad (5)$$

where $p_{rms,i}$ is the rms pressure, τ is the rms pulse duration for the specific strike, N_s is the anticipated number of strikes (provided in Table 1) needed to install one pile, and N is the number of total piles to be installed.

For vibratory pile driving, cumulative exposures were computed by summing 1-second noise exposure by the duration needed to drive on pile (provided in Table 1), then by the number of piles to be driven in a given day, as shown in the equation below:

$$E_{sum} = \sum_{i=1}^{N} E_{1s,i} \Delta t_i \qquad (6)$$

where E_{1s} is the 1-second noise exposure, and Δt is the duration (provided in Table 1) need to install 1 pile by vibratory piling.

Frequency-specific transmission losses, $TL(f)$, were then computed using practical spreading along with frequency-specific absorption coefficients that were computed with nominal seawater properties (*i.e.*, salinity = 35 psu, pH = 8.0) at 15^{o}C at the surface by

$$TL(f) = 15 \log_{10}(R) + \alpha(f) R/1000 \qquad (7)$$

where $a(f)$ is dB/km, and R is the distance (radius) of the specific isopleth to the source in meters. For broadband sources such as those from pile driving, the transmission loss is the summation of the frequency-specific results.

Approach to Estimate Behavioral Zones

As mentioned earlier, isopleths to Level B behavioral zones are based on root-mean-square SPL (SPL_{rms}) that are specific for impulse (impact pile driving) and non-impulse (vibratory pile driving) sources. Distances to marine mammal behavior thresholds were calculated using a simple geometric spreading equation as shown in Equation (4).

A summary of the measured and modeled harassment zones is provided in Table 5. The maximum distance is 20,500 m from the source, since this is where landmass intercepts underwater sound propagation.

Table 5. Distances to Harassment Zones.

Pile type, size & pile driving method	Injury zone (m)					Behavior zone (m)
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid	
Vibratory removal, 24-in steel pile, 3 piles/day	10	10	55	10	10	6,040
Vibratory driving, 24-in steel pile, 3 piles/day	175	45	995	85	10	6,040
Vibratory removal, 30-in steel pile, 2 piles/day	55	10	345	25	10	20,500*
Vibratory removal, 30-in steel pile, 7 piles/day	125	35	725	55	10	20,500*
Vibratory driving, 30-in steel pile, 3 piles/day	175	45	995	85	10	20,500*
Vibratory driving, 36-in steel pile, 3 piles/day	175	45	995	85	10	20,500*
Vibratory driving, 78-in steel shaft, 1 pile/day	126	11	186	77	5	20,500*
Vibratory driving, 120-in steel shaft, 1 pile/day	126	11	186	77	5	20,500*
Vibratory driving, steel 12-in H-pile, 10 piles/day	4	1	6	2	0	1,000
Vibratory driving, steel sheet, 3 piles/day	14	1	21	9	1	8,577
Vibratory removal, steel sheet, 6 piles/day	23	2	33	14	1	8,577
Impact proofing, 24-in steel pile, 3 piles/day	135	10	75	35	10	875
Impact driving, 30-in steel pile, 3 piles/day	1,065	10	505	225	10	1,585

Impact proofing, 30-in steel pile, 5 piles/day	355	10	175	75	10	1,585

* Landmass intercepts at a distance of 20,500m from project area.

Estimated Takes from Proposed Construction Activity

Incidental take is estimated for each species by estimating the likelihood of a marine mammal being present within a Level A or Level B harassment zone during active pile driving or removal. The Level A calculation includes a duration component, along with an assumption (which can lead to overestimates in some cases) that animals within the zone stay in that area for the whole duration of the pile driving activity within a day. For all marine mammal species except harbor seals, California sea lions, and northern elephant seals, estimated takes are calculated based on ensonified area for a specific pile driving activity multiplied by the marine mammal density in the action area, multiplied by the number of pile driving (or removal) days. In most cases, marine mammal density data are from the U.S. Navy Marine Species Density Database (Navy 2015). Harbor porpoise density is based on a recent study by Jefferson et al. (2016) for the Eastern Whidbey area near the Mukilteo Ferry Terminal. Harbor seal, northern elephant seal, and California sea lion takes are based on observations in the Mukilteo area, since these data provide the best information on distribution and presence of these species that are often associated with nearby haulouts (see below).

The Level A take total was further adjusted by subtracting animals expected to occur within the exclusion zone, where pile driving activities are suspended when an animal is observed in or approaching the zone (see Mitigation section). Further, the number of Level B takes was adjusted to exclude those already counted for Level A takes.

The harbor seal take estimate is based on local seal abundance information from monitoring during the Mukilteo pier removal project. Marine mammal visual monitoring during

Mukilteo Ferry Terminal pier removal project showed an average daily observation of 7 harbor seals (WSDOT 2015). Based on a total of 175 pile driving days for the WSDOT Mukilteo Multimodal Phase 2 project, it is estimated that up to 1,225 harbor seals could be exposed to noise levels associated with "take". Since 9 days would involve impact pile driving of 30-in piles with Level A harassment zones beyond the required shutdown zones (225 m vs 160 m shutdown zone), we consider that 63 harbor seals exposed during these 9 days would experience Level A harassment.

The California sea lion take estimate is based on local sea lion abundance information during the Mukilteo Ferry Terminal pier removal project (WSDOT 2015). Marine mammal visual monitoring during the Mukilteo pier removal project indicates on average 7 sea lions were observed in the general area of the Mukilteo Ferry Terminal per day (WSDOT 2015). Based on a total of 175 pile driving days for the WSDOT Mukilteo Multimodal project, it is estimated that up to 1,225 California sea lions could be exposed to noise levels associated with "take". Since the Level A harassment zones of otarids are all very small (max. 10 m, Table 5), we do not consider it likely that any sea lions would be taken by Level A harassment. Therefore, all California sea lion takes estimated here are expected to be by Level B harassment.

Northern elephant seal is not common in the Mukilteo Multimodal Project area, however, their presence has been observed in Edmonds area just south of Mukilteo (Huey, Pers. Comm. April 2017). Therefore, a potential take of 20 animals by Level B harassment during the project period is assessed. Since northern elephant seal is very uncommon in the project area, we do not consider it likely that any elephant seal would be taken by Level A harassment.

However, the method used in take estimates does not account for single individuals being taken multiple times during the entire project period of 175 days. Therefore, the percent of

marine mammals that are likely to be taken for a given population would be far less than the ratio of numbers of animals taken divided by the population size. For harbor porpoise, the estimated incidences of takes at 6,759 animals would be 60.2% of the population, if each single take were a unique individual. However, this is highly unlikely because the results of telemetry and photo-identification studies in Washington waters have demonstrated that harbor porpoise shows site fidelity to small areas for periods of time that can extend between seasons (Hanson et al. 1999; Hanson 2007a, 2007b). Based on studies by Jefferson et al. (2016), harbor porpoise abundance in the East Whidbey region, which is adjunct to the Mukilteo Ferry Terminal construction, is 497, and harbor porpoise abundance in the entire surrounding area of North Puget Sound is 1,798.

For Southern Resident killer whales, potential takes based on density calculation showed that 4 animals could be exposed to noise levels for Level B harassment. However, mitigation measures prescribed below will prevent such takes.

A summary of estimated marine mammal takes is listed in Table 6.

Table 6. Estimated numbers of marine mammals that may be exposed to received noise levels that cause Level A or Level B harassment.

Species	Estimated Level A take	Estimated Level B take	Estimated total take	Abundance	Percentage
Pacific harbor seal	63	1,162	1,225	11,036	11.1%
California sea lion	0	1,225	1,225	296,750	0.41%
Northern elephant seal	0	20	20	179,000	0.01%
Steller sea lion	0	232	232	71,562	0.32%
Killer whale, transient	0	21	21	243	8.64%
Killer whale, Southern Resident	0	0	0	78	0%
Gray whale	0	45	45	20,990	0.21%
Humpback whale	0	6	6	1,918	0.31%
Harbor porpoise	61	6,698	6,759	11,233	60.2%
Dall's porpoise	4	417	421	25,750	1.63%

Proposed Mitigation

In order to issue an IHA under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, "and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking" for certain subsistence uses. NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully balance two primary factors: 1) the manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat, which considers the nature of the potential adverse impact being mitigated (likelihood, scope, range), as well as the likelihood that the measure will be effective if implemented; and the likelihood of effective implementation, and; 2) the practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Mitigation for Marine Mammals and their Habitat

1. Time Restriction

Work would occur only during daylight hours, when visual monitoring of marine mammals can be conducted. In addition, all in-water construction will be limited to the period between August 1, 2017, and February 15, 2018.

2. Use of Noise Attenuation Devices

To reduce impact on marine mammals, WSDOT shall use a marine pile driving energy attenuator (*i.e.*, air bubble curtain system), or other equally effective sound attenuation method (*e.g.*, dewatered cofferdam) for all impact pile driving.

3. Establishing and Monitoring Level A, Level B Harassment Zones, and Exclusion Zones

Before the commencement of in-water construction activities, which include impact pile driving and vibratory pile driving and pile removal, WSDOT shall establish Level A harassment zones where received underwater SPLs or SEL_{cum} could cause PTS (see above).

WSDOT shall also establish Level B harassment zones where received underwater SPLs are higher than 160 dB_{rms} and 120 dB_{rms} re 1 µPa for impulse noise sources (impact pile driving) and non-impulses noise sources (vibratory pile driving and pile removal), respectively.

WSDOT shall establish a maximum 160-m Level A exclusion zone for all marine mammals except low-frequency baleen whales. For Level A harassment zones that are smaller than 160 m from the source, WSDOT shall establish exclusion zones that correspond to the estimated Level A harassment distances, but shall not be less than 10 m. For low-frequency baleen whales, WSDOT shall establish exclusion zones that correspond to the actual Level A harassment distances, but shall not be less than 10 m.

A summary of exclusion zones is provided in Table 7.

Table 7. Exclusion Zones for Various Pile Driving Activities and Marine Mammal Hearing Groups.

Pile type, size & pile driving method	**Injury zone (m)**				
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid

Vibratory removal, 24-in steel pile, 3 piles/day	10	10	55	10	10
Vibratory removal, 30-in steel pile, 2 piles/day	55	10	160	25	10
Vibratory removal, 30-in steel pile, 7 piles/day	125	35	160	55	10
Vibratory driving, 24-, 30- & 36-in steel pile, 3 piles/day	175	45	160	85	10
Vibratory driving, 78-, 120-in steel shaft, 1 pile/day	126	11	160	77	10
Vibratory driving, steel 12-in H-pile, 10 piles/day	4	1	6	2	1
Vibratory driving, steel sheet, 3 piles/day	14	1	21	9	1
Vibratory removal, steel sheet, 6 piles/day	23	2	33	14	1
Impact proofing, 24-in steel pile, 3 piles/day	135	10	75	35	10
Impact driving, 30-in steel pile, 3 piles/day	1,065	10	160	160	10
Impact proofing, 30-in steel pile, 5 piles/day	355	10	160	75	10

NMFS-approved protected species observers (PSO) shall conduct an initial survey of the exclusion zones to ensure that no marine mammals are seen within the zones before pile driving and pile removal of a pile segment begins. If marine mammals are found within the exclusion zone, pile driving of the segment would be delayed until they move out of the area. If a marine mammal is seen above water and then dives below, the contractor would wait 30 minutes. If no marine mammals are seen by the observer in that time it can be assumed that the animal has moved beyond the exclusion zone.

If pile driving of a segment ceases for 30 minutes or more and a marine mammal is sighted within the designated exclusion zone prior to commencement of pile driving, the observer(s) must notify the pile driving operator (or other authorized individual) immediately and continue to monitor the exclusion zone. Operations may not resume until the marine mammal has exited the exclusion zone or 30 minutes have elapsed since the last sighting.

4. Soft Start

A "soft-start" technique is intended to allow marine mammals to vacate the area before the impact pile driver reaches full power. Whenever there has been downtime of 30 minutes or more without impact pile driving, the contractor will initiate the driving with ramp-up procedures described below.

Soft start for impact hammers requires contractors to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets. Each day, WSDOT will use the soft-start technique at the beginning of impact pile driving, or if pile driving has ceased for more than 30 minutes.

5. Shutdown Measures

WSDOT shall implement shutdown measures if a marine mammal is detected within an exclusion zone or is about to enter an exclusion zone listed in Table 6.

WSDOT shall also implement shutdown measures if southern resident killer whales are sighted within the vicinity of the project area and are approaching the Level B harassment zone (or Zone of Influence, ZOI) during in-water construction activities.

If a killer whale approaches the ZOI during pile driving or removal, and it is unknown whether it is a Southern Resident killer whale or a transient killer whale, it shall be assumed to be a Southern Resident killer whale and WSDOT shall implement the shutdown measure.

If a Southern Resident killer whale or an unidentified killer whale enters the ZOI undetected, in-water pile driving or pile removal shall be suspended until the whale exits the ZOI to avoid further level B harassment.

Further, WSDOT shall implement shutdown measures if the number of authorized takes for any particular species reaches the limit under the IHA (if issued) and if such marine

mammals are sighted within the vicinity of the project area and are approaching the Level B harassment zone during in-water construction activities.

6. Coordination with Local Marine Mammal Research Network

Prior to the start of pile driving for the day, the Orca Network and/or Center for Whale Research will be contacted by WSDOT to find out the location of the nearest marine mammal sightings. The Orca Sightings Network consists of a list of over 600 (and growing) residents, scientists, and government agency personnel in the U.S. and Canada. Sightings are called or emailed into the Orca Network and immediately distributed to other sighting networks including: the NMFS Northwest Fisheries Science Center, the Center for Whale Research, Cascadia Research, the Whale Museum Hotline and the British Columbia Sightings Network.

Sightings information collected by the Orca Network includes detection by hydrophone. The SeaSound Remote Sensing Network is a system of interconnected hydrophones installed in the marine environment of Haro Strait (west side of San Juan Island) to study orca communication, in-water noise, bottom fish ecology and local climatic conditions. A hydrophone at the Port Townsend Marine Science Center measures average in-water sound levels and automatically detects unusual sounds. These passive acoustic devices allow researchers to hear when different marine mammals come into the region. This acoustic network, combined with the volunteer (incidental) visual sighting network allows researchers to document presence and location of various marine mammal species.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, all of which are described above, NMFS has preliminarily determined that the proposed mitigation measures provide the means effecting the least practicable adverse

impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth, "requirements pertaining to the monitoring and reporting of such taking." The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density).
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors.

- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks.
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat).
- Mitigation and monitoring effectiveness.

Proposed Monitoring Measures

WSDOT shall employ NMFS-approved PSOs to conduct marine mammal monitoring for its Mukilteo Multimodal Project. The PSOs will observe and collect data on marine mammals in and around the project area for 30 minutes before, during, and for 30 minutes after all pile removal and pile installation work. NMFS-approved PSOs shall meet the following requirements:

1. Independent observers (*i.e.*, not construction personnel) are required;
2. At least one observer must have prior experience working as an observer;
3. Other observers may substitute education (undergraduate degree in biological science or related field) or training for experience;
4. Where a team of three or more observers are required, one observer should be designated as lead observer or monitoring coordinator. The lead observer must have prior experience working as an observer; and
5. NMFS will require submission and approval of observer CVs;

Monitoring of marine mammals around the construction site shall be conducted using high-quality binoculars (*e.g.*, Zeiss, 10 x 42 power). Due to the different sizes of ZOIs from different pile sizes, several different ZOIs and different monitoring protocols corresponding to a specific pile size will be established.

- For Level A zones less than 160 m and Level B zones less than 1,000 m (i.e., vibratory 12-in H pile driving, 10 piles/day; impact proofing of 24-in steel piles, 3 piles/day), two land-based PSOs will monitor the exclusion zones and Level B harassment zone.
- For Level A zones between 160 and 500 m, and Level B zones between 1,000 and 10,000 m (i.e, vibratory pile driving and removal of 24-in steel piles, 3 piles/day; vibratory driving and removal of steel sheet; and impact proofing of 30-in steel piles, 5 piles/day), 5 land-based PSOs and 1 vessel-based PSO on a ferry will monitor the Level A and Level B harassment zones.
- For the rest of the pile driving and pile removal scenario, 5 land-based PSOs and 2 vessel-based PSOs on ferries will monitor the Level A and Level B harassment zones.

Locations of the land-based PSOs and routes of monitoring vessels are shown in WSDOT's Marine Mammal Monitoring Plan, which is available online at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*.

To verify the required monitoring distance, the exclusion zones and ZOIs will be determined by using a range finder or hand-held global positioning system device.

Proposed Reporting Measures

WSDOT would be required to submit a draft monitoring report within 90 days after completion of the construction work or the expiration of the IHA (if issued), whichever comes earlier. This report would detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed. NMFS would have an opportunity to provide comments on the report, and if NMFS has comments, WSDOT would address the comments and submit a final report to NMFS within 30 days.

In addition, NMFS would require WSDOT to notify NMFS' Office of Protected Resources and NMFS' West Coast Stranding Coordinator within 48 hours of sighting an injured or dead marine mammal in the construction site. WSDOT shall provide NMFS and the Stranding Network with the species or description of the animal(s), the condition of the animal(s) (including carcass condition, if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In the event that WSDOT finds an injured or dead marine mammal that is not in the construction area, WSDOT would report the same information as listed above to NMFS as soon as operationally feasible.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival" (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are

incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, this introductory discussion of our analyses applies to all the species listed in Table 7, given that the anticipated effects of WSDOT's Mukilteo Multimodal Project activities involving pile driving and pile removal on marine mammals are expected to be relatively similar in nature. There is no information about the nature or severity of the impacts, or the size, status, or structure of any species or stock that would lead to a different analysis by species for this activity, or else species-specific factors would be identified and analyzed.

Although a few marine mammal species (63 harbor seals, 61 harbor porpoises, and 4 Dall's porpoise) are estimated to experience Level A harassment in the form of PTS if they stay within the Level A harassment zone during the entire pile driving for the day, the degree of injury is expected to be mild and is not likely to affect the reproduction or survival of the individual animals because most animals will avoid the area, and thus avoid injury. It is expected that, if hearing impairments occurs, most likely the affected animal would loss a few dB in its hearing sensitivity, which in most cases is not likely to affect its survival and recruitment. Hearing impairment that occur for these individual animals would be limited to the dominant frequency of the noise sources, *i.e.*, in the low-frequency region below 2 kHz. Therefore, the degree of PTS is not likely to affect the echolocation performance of the two porpoise species, which use frequencies mostly above 100 kHz. Nevertheless, for all marine mammal species, it is known that in general animals avoid areas where sound levels could cause hearing impairment. Therefore it is not likely that an animal would stay in an area with intense noise that could cause severe levels of hearing damage. In addition, even if an animal receives a

TTS, the TTS would be a one-time event from the exposure, making it unlikely that the TTS would evolve into PTS. Furthermore, Level A take estimates were based on the assumption that the animals are randomly distributed in the project area and would not avoid intense noise levels that could cause TTS or PTS. In reality, animals tend to avoid areas where noise levels are high (Richardson *et al*., 1995).

For the rest of the three marine mammal species, takes that are anticipated and proposed to be authorized are expected to be limited to short-term Level B harassment (behavioral and TTS). Marine mammals present in the vicinity of the action area and taken by Level B harassment would most likely show overt brief disturbance (startle reaction) and avoidance of the area from elevated noise levels during pile driving and pile removal and the implosion noise. These behavioral distances are not expected to affect marine mammals' growth, survival, and reproduction due to the limited geographic area that would be affected in comparison to the much larger habitat for marine mammals in the Puget Sound. A few marine mammals could experience TTS if they occur within the Level B TTS ZOI. However, as discussed earlier in this document, TTS is a temporary loss of hearing sensitivity when exposed to loud sound, and the hearing threshold is expected to recover completely within minutes to hours. Therefore, it is not considered an injury.

The project also is not expected to have significant adverse effects on affected marine mammals' habitat, as analyzed in detail in the "**Anticipated Effects on Marine Mammal Habitat**" section. There is no ESA designated critical area in the vicinity of the Mukilteo Multimodal Project area. The project activities would not permanently modify existing marine mammal habitat. The activities may kill some fish and cause other fish to leave the area temporarily, thus impacting marine mammals' foraging opportunities in a limited portion of the

foraging range; but, because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences. Therefore, given the consideration of potential impacts to marine mammal prey species and their physical environment, WSDOT's proposed construction activity at Mukilteo Ferry Terminal would not adversely affect marine mammal habitat.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals.

The estimated takes are below 12 percent of the population for all marine mammals except harbor porpoise (Table 7). For harbor porpoise, the estimate of 6,759 incidences of takes would be 60.2 percent of the population, if each single take were a unique individual. However, this is highly unlikely because the harbor porpoise in Washington waters shows site fidelity to small areas for periods of time that can extend between seasons (Hanson et al. 1999; Hanson

2007a, 2007b). For example, Hanson et al. (1999) tracked a female harbor porpoise for 215 days, during which it remained exclusively within the southern Strait of Georgia region. Based on studies by Jefferson et al. (2016), harbor porpoise abundance in the East Whidbey region, which is adjunct to the Mukilteo Ferry Terminal construction, is 497, and harbor porpoise abundance in the entire surrounding area of North Puget Sound is 1,798. Therefore, if the estimated incidents of take accrued to all the animals expected to occur in the entire North Puget Sound area (1,798 animals), it would be 16.01 percent of the Washington inland water stock of the harbor porpoise.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Subsistence Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act (ESA)

Issuance of an MMPA authorization requires compliance with the ESA for any species that are listed or proposed as threatened or endangered.

The humpback whale and the killer whale (southern resident distinct population segment (DPS)) are the only marine mammal species listed under the ESA that could occur in the vicinity of WSDOT's proposed construction project. Two DPSs of the humpback whale stock, the Mexico DPS and the Central America DPS, are listed as threatened and endangered under the

ESA, respectively. NMFS' Office of Protected Resources has initiated consultation with NMFS' West Coast Regional Office under section 7 of the ESA on the issuance of an IHA to WSDOT under section 101(a)(5)(D) of the MMPA for this activity.

NMFS will conclude the ESA consultation prior to reaching a determination regarding the proposed issuance of the authorization.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to WSDOT for conducting Mukilteo Multimodal Project phase 2 between August 1, 2016, and February 15, 2017, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. This section contains a draft of the IHA itself. The wording contained in this section is proposed for inclusion in the IHA (if issued).

1. This Authorization is valid from August 1, 2017, through July 31, 2018.

2. This Authorization is valid only for activities associated with in-water construction work at the Mukilteo Multimodal Project phase 2 in the State of Washington.

3. (a) The species authorized taking by, Level A and Level B harassment and in the numbers shown in Table 6 are: Pacific harbor seal (*Phoca vitulina*), northern elephant seal (*Mirounga angustirostris*), California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*), killer whale (*Orcinus orca*), gray whale (*Eschrichtius robustus*), humpback whale (*Megaptera novaeangliae*), harbor porpoise (*Phocoena phocoena*), and Dall's porpoise (*P. dalli*).

(b) The authorization for taking by harassment is limited to the following acoustic sources and from the following activities:

- Impact pile driving;

- Vibratory pile driving; and
- Vibratory pile removal.

4. Prohibitions.

(a) The taking, by incidental harassment only, is limited to the species listed under condition 3(a) above and by the numbers listed in Table 6 of this notice. The taking by death of these species or the taking by harassment, injury or death of any other species of marine mammal is prohibited unless separately authorized or exempted under the MMPA and may result in the modification, suspension, or revocation of this Authorization.

(b) The taking of any marine mammal is prohibited whenever the required protected species observers (PSOs), required by condition 7(a), are not present in conformance with condition 7(a) of this Authorization.

5. Mitigation.

(a) *Time Restriction*. In-water construction work shall occur only during daylight hours.

(b) Establishment of Level A and Level B Harassment Zones.

(A) Before the commencement of in-water pile driving/removal activities, WSDOT shall establish Level A harassment zones. The modeled Level A zones are summarized in Table 5.

(B) Before the commencement of in-water pile driving/removal activities, WSDOT shall establish Level B harassment zones. The modeled Level B zones are summarized in Table 5.

(C) Before the commencement of in-water pile driving/removal activities, WSDOT shall establish exclusion zones. The proposed exclusion zones are summarized in Table 7.

(c) Monitoring of marine mammals shall take place starting 30 minutes before pile driving begins until 30 minutes after pile driving ends.

(d) Soft Start.

(i) When there has been downtime of 30 minutes or more without pile driving, the contractor will initiate the driving with ramp-up procedures described below.

(ii) Soft start for impact hammers requires contractors to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three-strike sets. Each day, WSDOT will use the soft-start technique at the beginning of impact pile driving, or if pile driving has ceased for more than 30 minutes.

(e) Shutdown Measures.

(i) WSDOT shall implement shutdown measures if a marine mammal is detected within or to be approaching the exclusion zones provided in Table 7 of this notice.

(ii) WSDOT shall implement shutdown measures if southern resident killer whales (SRKWs) are sighted within the vicinity of the project area and are approaching the Level B harassment zone (zone of influence, or ZOI) during in-water construction activities.

(iii) If a killer whale approaches the ZOI during pile driving or removal, and it is unknown whether it is a SRKW or a transient killer whale, it shall be assumed to be a SRKW and WSDOT shall implement the shutdown measure identified in 6(e)(ii).

(iv) If a SRKW enters the ZOI undetected, in-water pile driving or pile removal shall be suspended until the SRKW exits the ZOI to avoid further level B harassment.

(v) WSDOT shall implement shutdown measures if the number of any allotted marine mammal takes reaches the limit under the IHA, if such marine mammals are sighted within the

vicinity of the project area and are approaching the Level B harassment zone during pile removal activities.

(f) Coordination with Local Marine Mammal Research Network.

Prior to the start of pile driving, WSDOT will contact the Orca Network and/or Center for Whale Research to get real-time information on the presence or absence of whales before starting any pile driving.

6. Monitoring.

(a) Protected Species Observers.

WSDOT shall employ NMFS-approved PSOs to conduct marine mammal monitoring for its construction project. NMFS-approved PSOs will meet the following qualifications.

(i) Independent observers (*i.e.*, not construction personnel) are required.

(ii) At least one observer must have prior experience working as an observer.

(iii) Other observers may substitute education (undergraduate degree in biological science or related field) or training for experience.

(iv) Where a team of three or more observers are required, one observer should be designated as lead observer or monitoring coordinator. The lead observer must have prior experience working as an observer.

(v) NMFS will require submission and approval of observer CVs.

(b) Monitoring Protocols: PSOs shall be present on site at all times during pile removal and driving.

(i) A 30-minute pre-construction marine mammal monitoring will be required before the first pile driving or pile removal of the day. A 30-minute post-construction marine mammal monitoring will be required after the last pile driving or pile removal of the day. If the

constructors take a break between subsequent pile driving or pile removal for more than 30 minutes, then additional 30-minute pre-construction marine mammal monitoring will be required before the next start-up of pile driving or pile removal.

(iii) Marine mammal visual monitoring will be conducted for different ZOIs based on different sizes of piles being driven or removed, as shown in maps in WSDOT's Marine Mammal Monitoring Plan.

(A) For Level A zones less than 160 m and Level B zones less than 1,000 m (i.e., vibratory 12-in H pile driving, 10 piles/day; impact proofing of 24-in steel piles, 3 piles/day), two land-based PSOs will monitor the exclusion zones and Level B harassment zone.

(B) For Level A zones between 160 and 500 m, and Level B zones between 1,000 and 10,000 m (i.e, vibratory pile driving and removal of 24-in steel piles, 3 piles/day; vibratory driving and removal of steel sheet; and impact proofing of 30-in steel piles, 5 piles/day), 5 land-based PSOs and 1 vessel-based PSO on a ferry will monitor the Level A and Level B harassment zones.

(C) For the rest of the pile driving and pile removal scenario, 5 land-based PSOs and 2 vessel-based PSOs on ferries will monitor the Level A and Level B harassment zones.

(iv) If marine mammals are observed, the following information will be documented:

(A) Species of observed marine mammals;

(B) Number of observed marine mammal individuals;

(C) Behavior of observed marine mammals;

(D) Location within the ZOI; and

7. Reporting:

(a) WSDOT shall provide NMFS with a draft monitoring report within 90 days of the conclusion of the construction work or within 90 days of the expiration of the IHA, whichever comes first. This report shall detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed.

(b) If comments are received from NMFS Office of Protected Resources on the draft report, a final report shall be submitted to NMFS within 30 days thereafter. If no comments are received from NMFS, the draft report will be considered to be the final report.

(c) In the unanticipated event that the construction activities clearly cause the take of a marine mammal in a manner prohibited by this Authorization (if issued), such as an injury, serious injury, or mortality, WSDOT shall immediately cease all operations and immediately report the incident to the Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinators. The report must include the following information:

(i) Time, date, and location (latitude/longitude) of the incident;

(ii) description of the incident;

(iii) status of all sound source use in the 24 hours preceding the incident;

(iv) environmental conditions (*e.g.*, wind speed and direction, sea state, cloud cover, visibility, and water depth);

(v) description of marine mammal observations in the 24 hours preceding the incident;

(vi) species identification or description of the animal(s) involved;

(vii) the fate of the animal(s); and

(viii) photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with WSDOT to determine what is necessary to minimize the

likelihood of further prohibited take and ensure MMPA compliance. WSDOT may not resume their activities until notified by NMFS via letter, email, or telephone.

(E) In the event that WSDOT discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as described in the next paragraph), WSDOT will immediately report the incident to the Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinators. The report must include the same information identified above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with WSDOT to determine whether modifications in the activities are appropriate.

(F) In the event that WSDOT discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), WSDOT shall report the incident to the Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinators, within 24 hours of the discovery. WSDOT shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. WSDOT can continue its operations under such a case.

8. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein or if NMFS determines the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

9. A copy of this Authorization must be in the possession of each contractor who performs the construction work at the Mukilteo Ferry Terminal.

Request for Public Comments

We request comment on our analyses, the draft authorization, and any other aspect of this Notice of Proposed IHA for the WSDOT's Mukilteo Multimodal Project Phase 2. Please include with your comments any supporting data or literature citations to help inform our final decision on the request for MMPA authorization.

Dated: May 4, 2017.

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Donna S. Wieting,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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